HYDRAULIC TESTING OF ENGINE CYLINDERS (THREE-PIECE, STEEL-HEAD TYPE)

This test can be applied on complete cylinder assemblies or on partially complete assemblies. Before testing, the following conditions must prevail:

1. The cylinder must be assembled to at least include the head and liner in the jacket, and a good set of valves secured in the valve seats. Valves can be secured using the standard springs, spring seats, keepers and retainers; or, to use the method employed at the factory, apply side pressure to test valve shanks by encircling all four shanks with a large O-ring. This will hold the valves in sufficient contact with the valve seats until test oil pressure seals the valves to their seats. Test valves, with O-rings in the seal surfaces, are:

   Part 147X1935 – for 45-degree valve seats
   Part 147X1936 – for 15-degree valve seats.

2. The fuel nozzle and compression-relief plug must not be assembled, but it is necessary to have the nozzle securing hardware in place.

The procedure for testing follows:

1. Set up the cylinder assembly to be tested on the test facility, Part 147X1738 (see Fig. 1), in the following manner:

   a. Check the O-ring in the dummy piston and replace, if necessary. Lubricate the O-ring by applying a light film of fuel oil.

   b. Every fifth cylinder, check the length of the four cylinder hold-down bolts, Part 121X1045-1, using stretch gage, Part 147X1739. Any bolt which shows evidence of stretching should be replaced with a new bolt.

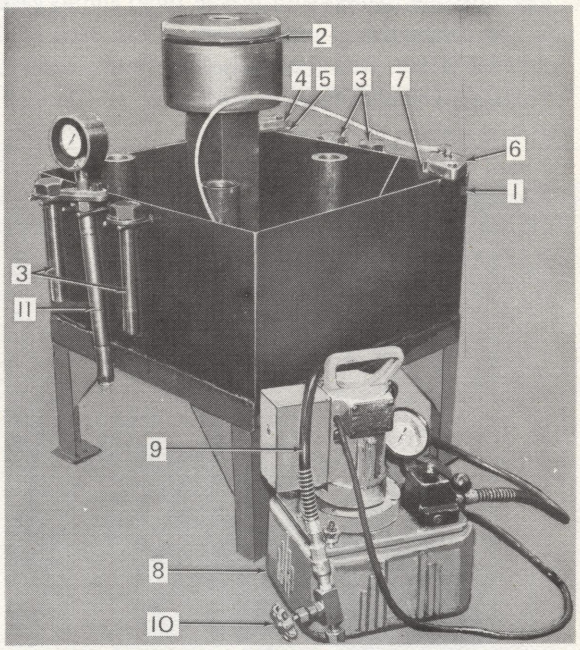

FIG. 1, E-16666

REF.	DESCRIPTION
1	TEST STAND
2	O-RING FOR DUMMY PISTON
3	CYLINDER HOLD-DOWN BOLTS (FOUR REQUIRED)
4	BLANKING PLATE, WATER INLET PORT
5	GASKET FOR BLANKING PLATE
6	FLANGE WITH PLASTIC TUBE, WATER OUTLET PORT
7	GASKET FOR FLANGE
8	PUMP SET WITH OIL RESERVOIR, VALVE AND GAGE
9	PUMP DISCHARGE HOSE
10	SHUT-OFF VALVE
11	TEST INJECTOR WITH GAGE

FIG. 1. HYDRAULIC TEST FACILITY.

c. Set the cylinder assembly on the test facility and secure it with four hold-down bolts. Tighten all bolts equally, using an impact wrench or a torque wrench.

These instructions do not purport to cover all details or variations in equipment nor to provide for every possible contingency to be met in connection with installation, operation or maintenance. Should further information be desired or should particular problems arise which are not covered sufficiently for the purchaser's purposes, the matter should be referred to the General Electric Company.

Verify numbers for parts, tools, or material by using the Renewal Parts or Tool Catalogs, or contact your General Electric representative for assistance. Do not order from this publication.

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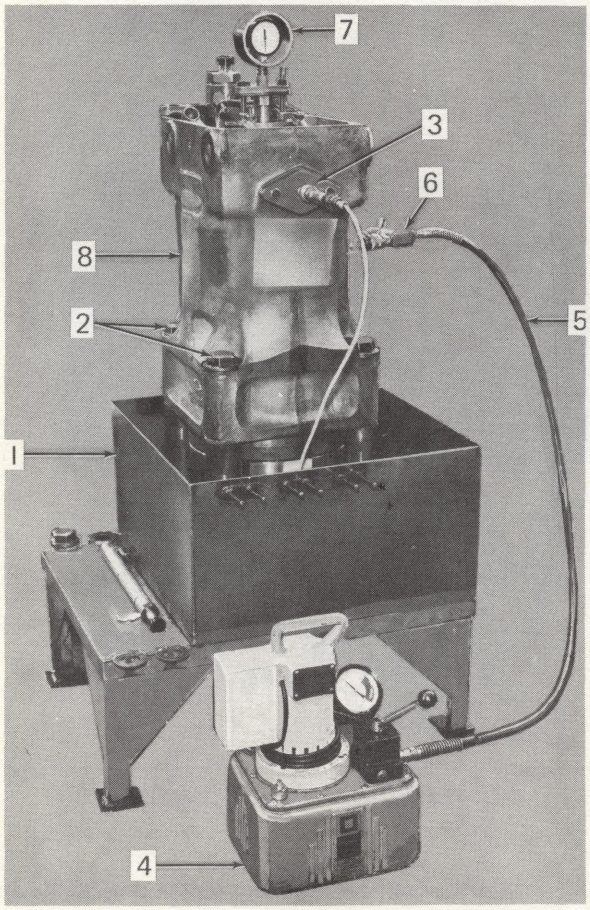
CAUTION: *Do not use gas testing fixture 147X1486 unless it is properly modified for higher applied pressures. Otherwise personal injury may result.*

2. Assemble the blanking plate and gasket to the cooling-water inlet port on the front side of the cylinder jacket.

3. Assemble the flange (with plastic tube) and its gasket to the cooling-water outlet port on the back of the cylinder jacket. Run the plastic tube into a container partially filled with fuel oil. See Fig. 2.



REF.	DESCRIPTION
1	TEST STAND
2	CYLINDER HOLD-DOWN BOLTS
3	FLANGE WITH PLASTIC TUBE, WATER OUTLET PORT
4	PUMP SET
5	PUMP DISCHARGE HOSE
6	SHUT-OFF VALVE
7	TEST INJECTOR WITH GAGE
8	CYLINDER ASSEMBLY BEING TESTED

FIG. 2, E-16667

FIG. 2. HYDRAULIC TESTING OF CYLINDER ASSEMBLY.

4. Assemble a new copper compression-relief-plug washer, Part 115X1948, in the compression-relief adapter. Connect the pump discharge hose and the shut-off valve to the adapter. Open the shut-off valve.

5. Fill the combustion chamber with fuel oil to the top of the injector nozzle hole.

6. Assemble the test injector with the gage and secure with the flange and nuts. Use a new copper nozzle gasket, Part 115X1155, as required.

7. Turn the pump motor ON and charge the combustion chamber with 5000 psi hydraulic pressure. Close the shut-off valve and turn the pump motor OFF.

NOTE: *Gages on test stand and hydraulic pump should be calibrated periodically. Two gages were included initially to monitor gage accuracy.*

8. Maintain the 5000-psi test pressure for six (6) minutes and observe the conditions shown in Table I.

CAUTION: *The pressure relief valve should be set at 5500 psi, otherwise head to liner seals may be permanantly damaged.*

9. After completing the pressure test, open the shut-off valve and relieve the pressure at the pump.

10. When both pressure gages read zero, close the shut-off valve and remove all test equipment from the cylinder assembly, including removal of the four (4) cylinder hold-down bolts.

11. Remove the cylinder assembly from the test fixture and lay it horizontally on a suitable bench or table, with the front face of the cylinder up.

12. Re-torque all clamp-ring bolts to 70-75 lb.-ft.

13. Check the head-to-liner gap with a 0.0015 in. thickness gage. Only one gap, not to exceed 3 in. in length measured along the circumference, is permitted. This gap is permitted only when the cylinder has previously passed the hydraulic-pressure test.

14. Remove the test valves used during the test.

15. Fit new or reground valves to the cylinder assembly.

16. Complete the balance of cylinder assembly, or re-apply parts on the cylinder assembly removed for test, depending on condition of the cylinder assembly prior to test.

TABLE I, HYDRAULIC TESTING

Condition (after 6 minutes)	Observe	Action to Take
Pressure does not drop more than 500 psi.	Gage	Accept as good cylinder assembly.
Pressure drops below 4500 psi and bubbles appear in container of fuel oil.	Gage and end of plastic tube	Reject cylinder assembly due to defective top liner seal.
Pressure drops below 4500 psi and fuel oil is seen above valve seat(s).	Check valve stems through air intake and exhaust openings.	Record and/or mark defective valve(s) and reject cylinder assembly. Rework valves, clean cylinder assembly, and repeat test.
Pressure drops below 4500 psi, no bubbles in container, and no fuel oil around valve stems.	Check for leakage at base of injector nozzle, gage connections, compression-relief adapter, shut-off valve, pump discharge hose, and dummy-piston O-ring.	Correct defective test equipment, install new copper gaskets at compression-relief adapter and base of test nozzle, and re-test cylinder assembly.